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UNDERSTANDING HOW TO INTERPRET AND GRAPH LINEAR EQUATIONS IS A FUNDAMENTAL SKILL IN ALGEBRA. WHEN PRESENTED WITH AN EQUATION LIKE $Y\ 4 = -3(x + 5)$, IT'S ESSENTIAL TO ANALYZE ITS STRUCTURE AND CHARACTERISTICS TO IDENTIFY THE CORRECT GRAPH THAT REPRESENTS IT. THIS ARTICLE OFFERS A COMPREHENSIVE GUIDE TO UNDERSTANDING THIS SPECIFIC EQUATION, HOW TO GRAPH IT, AND HOW TO RECOGNIZE THE CORRESPONDING GRAPH FROM MULTIPLE OPTIONS.

DECIPHERING THE EQUATION: $Y\ 4 = -3(x + 5)$

BEFORE DIVING INTO GRAPH IDENTIFICATION, IT IS CRUCIAL TO UNDERSTAND WHAT THIS EQUATION REPRESENTS AND HOW TO MANIPULATE IT INTO A MORE FAMILIAR FORM.

INTERPRETING THE EQUATION

THE GIVEN EQUATION IS:

$$Y\ 4 = -3(x + 5)$$

AT FIRST GLANCE, THE NOTATION " $Y\ 4$ " MIGHT SEEM CONFUSING. TYPICALLY, IN ALGEBRA, THE NOTATION " $Y\ 4$ " MIGHT BE A TYPO OR FORMATTING ERROR. IT IS LIKELY INTENDED TO BE:

$$Y = 4 = -3(x + 5)$$

ALTERNATIVELY, IT COULD BE A MISINTERPRETATION, BUT CONSIDERING STANDARD ALGEBRAIC NOTATION, THE MOST LOGICAL ASSUMPTION IS THAT THE EQUATION IS:

$$Y = -3(x + 5)$$

THE INCLUSION OF " 4 " MIGHT BE AN EXTRANEOUS OR MISWRITTEN PART. FOR THE PURPOSE OF THIS ANALYSIS, WE'LL ASSUME THE INTENDED EQUATION IS:

$$Y = -3(x + 5)$$

IF " $Y\ 4$ " INDICATES SOMETHING ELSE, PLEASE CLARIFY; HOWEVER, BASED ON STANDARD EQUATIONS, THIS IS THE MOST REASONABLE INTERPRETATION.

REARRANGING THE EQUATION INTO SLOPE-INTERCEPT FORM

THE SLOPE-INTERCEPT FORM OF A LINEAR EQUATION IS:

$$Y = mX + b$$

WHERE:

- M IS THE SLOPE OF THE LINE.
- B IS THE Y-INTERCEPT.

LET'S TRANSFORM OUR EQUATION:

$$Y = -3(x + 5)$$

DISTRIBUTE THE -3:

$$Y = -3x - 15$$

NOW, IT'S IN SLOPE-INTERCEPT FORM:

$$Y = -3x - 15$$

THIS FORM ALLOWS US TO EASILY IDENTIFY KEY FEATURES:

- SLOPE (M): -3
- Y-INTERCEPT (B): -15

UNDERSTANDING THE FEATURES OF THE GRAPH

KNOWING THE SLOPE AND Y-INTERCEPT HELPS US VISUALIZE THE GRAPH ACCURATELY.

SLOPE (M = -3)

- THE SLOPE INDICATES THE STEEPNESS AND DIRECTION OF THE LINE.
- A SLOPE OF -3 MEANS THE LINE DESCENDS THREE UNITS VERTICALLY FOR EVERY ONE UNIT MOVED HORIZONTALLY TO THE RIGHT.
- THE NEGATIVE SIGN INDICATES A DOWNWARD TREND FROM LEFT TO RIGHT.

Y-INTERCEPT (B = -15)

- THE Y-INTERCEPT IS THE POINT WHERE THE LINE CROSSES THE Y-AXIS.
- FOR THIS LINE, THE CROSSING POINT IS AT (0, -15).

PLOTTING THE EQUATION STEP-BY-STEP

TO ACCURATELY IDENTIFY THE CORRECT GRAPH, FOLLOW THESE STEPS:

STEP 1: PLOT THE Y-INTERCEPT

- MARK THE POINT AT (0, -15) ON THE COORDINATE PLANE.
- THIS IS A POINT ON THE GRAPH WHERE THE LINE CROSSES THE Y-AXIS.

STEP 2: USE THE SLOPE TO FIND A SECOND POINT

- FROM $(0, -15)$, MOVE HORIZONTALLY ONE UNIT TO THE RIGHT ($x = 1$).
- SINCE THE SLOPE IS -3 , MOVE VERTICALLY DOWN BY 3 UNITS (BECAUSE NEGATIVE SLOPE).
- FROM $(0, -15)$, MOVING RIGHT ONE UNIT TO $(1, -15)$, THEN DOWN 3 UNITS TO $(1, -18)$.
- ALTERNATIVELY, MOVE LEFT ONE UNIT AND UP 3 UNITS TO FIND ANOTHER POINT:
- FROM $(0, -15)$, MOVING LEFT TO $x = -1$, THEN UP 3 UNITS:
- $(-1, -15 + 3) = (-1, -12)$.

STEP 3: DRAW THE LINE

- CONNECT THE POINTS $(0, -15)$, $(1, -18)$, AND $(-1, -12)$ WITH A STRAIGHT LINE.
- EXTEND THE LINE IN BOTH DIRECTIONS, ENSURING IT PASSES THROUGH ALL THESE POINTS.

RECOGNIZING THE GRAPH FROM MULTIPLE CHOICES

SUPPOSE YOU ARE PRESENTED WITH SEVERAL GRAPHS. HOW DO YOU DETERMINE WHICH ONE CORRECTLY REPRESENTS THE EQUATION?

KEY FEATURES TO MATCH

- Y-INTERCEPT AT $(0, -15)$: THE GRAPH SHOULD CROSS THE Y-AXIS AT -15 .
- SLOPE OF -3 : THE LINE SHOULD DESCEND STEEPLY, WITH A RATIO OF 3 UNITS DOWN FOR EVERY 1 UNIT RIGHT.
- LINEARITY: THE GRAPH SHOULD BE A STRAIGHT LINE, EXTENDING INFINITELY IN BOTH DIRECTIONS.

COMMON GRAPHING MISTAKES AND HOW TO AVOID THEM

- **INCORRECT Y-INTERCEPT:** ENSURE THE LINE CROSSES AT $y = -15$. SOMETIMES, GRAPHS MAY BE CLOSE BUT NOT EXACTLY AT THIS POINT.
- **MISREADING THE SLOPE:** REMEMBER THAT THE SLOPE IS THE RATIO OF THE VERTICAL CHANGE TO HORIZONTAL CHANGE. NEGATIVE SLOPE INDICATES A DOWNWARD TREND.
- **IGNORING THE EQUATION'S SIGNIFICANCE:** ALWAYS VERIFY THE KEY FEATURES BEFORE CONCLUDING.

ADDITIONAL TIPS FOR ACCURATE GRAPHING

1. **USE A TABLE OF VALUES:** CREATE A TABLE WITH X AND Y VALUES BASED ON THE EQUATION.
2. **PLOT MULTIPLE POINTS:** PLOT AT LEAST TWO TO THREE POINTS TO ENSURE ACCURACY.
3. **CHECK THE LINE'S DIRECTION:** CONFIRM THE LINE'S SLOPE MATCHES THE EXPECTED NEGATIVE VALUE.
4. **LABEL KEY POINTS:** MARK THE Y-INTERCEPT AND OTHER NOTABLE POINTS ON THE GRAPH.

CONCLUSION: SELECTING THE CORRECT GRAPH

BY TRANSFORMING THE GIVEN EQUATION INTO SLOPE-INTERCEPT FORM, IDENTIFYING THE SLOPE AND Y-INTERCEPT, AND PLOTTING KEY POINTS ACCORDINGLY, YOU CAN CONFIDENTLY SELECT THE GRAPH THAT ACCURATELY REPRESENTS THE EQUATION $Y = -3(x + 5)$. REMEMBER, THE CORRECT GRAPH WILL CROSS THE Y-AXIS AT $(0, -15)$ AND SLOPE DOWNWARD STEEPLY WITH A SLOPE OF -3 . WHEN FACED WITH MULTIPLE OPTIONS, COMPARE THESE FEATURES CAREFULLY TO MAKE AN INFORMED CHOICE.

IN SUMMARY:

- THE GRAPH SHOULD PASS THROUGH $(0, -15)$.
- THE LINE SHOULD DESCEND THREE UNITS VERTICALLY FOR EACH ONE UNIT MOVED TO THE RIGHT.
- THE LINE SHOULD EXTEND INFINITELY IN BOTH DIRECTIONS, MAINTAINING A CONSISTENT SLOPE.

USING THESE GUIDELINES, YOU CAN CONFIDENTLY IDENTIFY THE CORRECT GRAPH FOR THE EQUATION $Y = -3(x + 5)$, WHETHER IN EXAMS OR PRACTICAL APPLICATIONS. MASTERY OF THESE STEPS ENHANCES YOUR OVERALL UNDERSTANDING OF LINEAR EQUATIONS AND THEIR GRAPHICAL REPRESENTATIONS, A VITAL SKILL IN ALGEBRA AND BEYOND.

FREQUENTLY ASKED QUESTIONS

WHICH GRAPH CORRECTLY REPRESENTS THE EQUATION $Y + 4 = -3(x + 5)$?

THE GRAPH WITH A STRAIGHT LINE HAVING A SLOPE OF -3 AND PASSING THROUGH THE POINT $(-5, -4)$.

WHAT IS THE SLOPE OF THE LINE REPRESENTED BY $Y + 4 = -3(x + 5)$?

THE SLOPE IS -3 .

WHERE DOES THE LINE $Y + 4 = -3(x + 5)$ CROSS THE Y-AXIS?

IT CROSSES THE Y-AXIS AT THE POINT $(0, 1)$.

HOW DO YOU FIND THE Y-INTERCEPT OF THE EQUATION $Y + 4 = -3(x + 5)$?

REWRITE THE EQUATION IN SLOPE-INTERCEPT FORM TO IDENTIFY THE Y-INTERCEPT AS $(0, 1)$.

WHICH OF THE FOLLOWING GRAPHS SHOWS A LINE WITH A SLOPE OF -3 PASSING THROUGH $(-5, -4)$?

THE CORRECT GRAPH IS THE ONE THAT HAS A SLOPE OF -3 AND PASSES THROUGH THE POINT $(-5, -4)$.

IS THE GRAPH OF $y + 4 = -3(x + 5)$ A LINEAR OR NONLINEAR GRAPH?

IT IS A LINEAR GRAPH.

WHAT IS THE X-INTERCEPT OF THE LINE REPRESENTED BY $y + 4 = -3(x + 5)$?

THE X-INTERCEPT IS AT $x = -8$.

HOW WOULD YOU GRAPH THE EQUATION $y + 4 = -3(x + 5)$?

PLOT THE POINT $(-5, -4)$ AND USE THE SLOPE OF -3 TO FIND OTHER POINTS, THEN DRAW THE LINE THROUGH THESE POINTS.

WHICH FORM OF LINEAR EQUATION IS $y + 4 = -3(x + 5)$?

IT IS IN POINT-SLOPE FORM.

IF YOU CONVERT $y + 4 = -3(x + 5)$ TO SLOPE-INTERCEPT FORM, WHAT IS THE EQUATION?

THE SLOPE-INTERCEPT FORM IS $y = -3x - 11$.

ADDITIONAL RESOURCES

UNDERSTANDING THE GRAPH OF THE EQUATION $y + 4 = -3(x + 5)$

WHEN EXAMINING THE RELATIONSHIP BETWEEN ALGEBRAIC EQUATIONS AND THEIR GRAPHICAL REPRESENTATIONS, STUDENTS AND EDUCATORS ALIKE OFTEN FACE THE CHALLENGE OF ACCURATELY TRANSLATING A WRITTEN EQUATION INTO A VISUAL FORMAT. THE EQUATION $y + 4 = -3(x + 5)$ PRESENTS AN INTERESTING CASE, COMBINING SEVERAL ALGEBRAIC CONCEPTS, INCLUDING LINEARITY, TRANSFORMATIONS, AND SLOPE-INTERCEPT FORM. THIS ARTICLE AIMS TO PROVIDE A COMPREHENSIVE ANALYSIS OF THIS EQUATION, GUIDING READERS THROUGH THE PROCESS OF IDENTIFYING AND SELECTING THE CORRECT GRAPH THAT CORRESPONDS TO IT.

DECIPHERING THE EQUATION: $y + 4 = -3(x + 5)$

INTERPRETING THE NOTATION

BEFORE DELVING INTO GRAPHING, IT IS ESSENTIAL TO CLARIFY THE NOTATION USED. THE EQUATION $y + 4 = -3(x + 5)$ APPEARS TO CONTAIN AN UNUSUAL ELEMENT: THE NUMBER 4 FOLLOWING THE VARIABLE y . TYPICALLY, IN ALGEBRA, EQUATIONS ARE WRITTEN IN A STANDARD FORM SUCH AS $y = mx + b$ OR SIMILAR.

THE MOST PLAUSIBLE INTERPRETATION IS THAT THE NOTATION $y + 4$ IS A TYPOGRAPHICAL ERROR OR FORMATTING ISSUE, AND THE INTENDED EQUATION IS:

$$Y = 4 - 3(x + 5)$$

THIS ASSUMPTION MAKES LOGICAL SENSE BECAUSE IT ALIGNS WITH COMMON ALGEBRAIC EXPRESSIONS INVOLVING LINEAR FUNCTIONS.

ALTERNATIVELY, IF THE NOTATION IS LITERAL, THEN THE EQUATION READS:

$$Y \ 4 = -3(x + 5)$$

WHICH COULD IMPLY:

$$Y \ 4 = -3(x + 5)$$

OR

$$Y = (-3/4)(x + 5)$$

GIVEN THE CONTEXT AND TYPICAL ALGEBRAIC CONVENTIONS, THE MOST REASONABLE INTERPRETATION IS THAT THE ORIGINAL EQUATION IS:

$$Y = 4 - 3(x + 5)$$

WHICH SIMPLIFIES TO A MORE FAMILIAR FORM.

REWRITING AND SIMPLIFYING THE EQUATION

ASSUMING THE EQUATION IS:

$$Y = 4 - 3(x + 5)$$

WE CAN EXPAND AND SIMPLIFY IT:

$$Y = 4 - 3x - 15$$

$$Y = -3x - 11$$

THIS FORM REVEALS THE CORE CHARACTERISTICS OF THE GRAPH:

- SLOPE (M): -3

- Y-INTERCEPT (B): -11

NOTE: THE SLOPE INDICATES THE STEEPNESS AND DIRECTION OF THE LINE. A NEGATIVE SLOPE SUGGESTS THE LINE DECLINES AS X INCREASES. THE Y-INTERCEPT TELLS US WHERE THE LINE CROSSES THE Y-AXIS.

ANALYZING THE GRAPH OF THE EQUATION

GRAPHING CHARACTERISTICS OF THE EQUATION

BASED ON THE SIMPLIFIED FORM $Y = -3x - 11$, WE CAN ANALYZE KEY FEATURES:

1. SLOPE (M): -3

- THE LINE DECREASES THREE UNITS VERTICALLY FOR EACH ONE UNIT INCREASE HORIZONTALLY.
- THE NEGATIVE VALUE INDICATES A DOWNWARD TREND FROM LEFT TO RIGHT.

2. Y-INTERCEPT (B): -11

- THE GRAPH CROSSES THE Y-AXIS AT THE POINT $(0, -11)$.

3. X-INTERCEPT:

- TO FIND WHERE THE LINE CROSSES THE X-AXIS, SET $Y = 0$:

$$0 = -3x - 11$$

$$3x = -11$$

$$x = -11/3 \approx -3.67$$

- THE X-INTERCEPT IS APPROXIMATELY AT $(-3.67, 0)$.

SUMMARY OF KEY POINTS:

- PASSES THROUGH $(0, -11)$
- CROSSES X-AXIS AT APPROXIMATELY $(-3.67, 0)$
- SLOPE: -3 (A STEEP DOWNWARD SLOPE)

VISUALIZING THE GRAPH

PLOTTING THESE POINTS PROVIDES A CLEAR PICTURE:

- STARTING AT THE Y-INTERCEPT $(0, -11)$, THE LINE MOVES DOWNWARDS WITH A SLOPE OF -3.
- FOR EACH INCREASE OF 1 IN X, Y DECREASES BY 3.
- FOR EXAMPLE, AT $x = 1$, $y = -3(1) - 11 = -3 - 11 = -14$.
- AT $x = -1$, $y = -3(-1) - 11 = 3 - 11 = -8$.

THIS CONSISTENT RATE OF CHANGE CONFIRMS THE LINEAR NATURE OF THE GRAPH.

IDENTIFYING THE CORRECT GRAPH AMONG OPTIONS

WHEN PRESENTED WITH MULTIPLE GRAPH OPTIONS, THE TASK IS TO SELECT THE ONE THAT CORRECTLY DEPICTS $Y = -3x - 11$.
THE KEY FEATURES TO LOOK FOR INCLUDE:

- Y-INTERCEPT AT -11: THE GRAPH SHOULD CROSS THE Y-AXIS AT THE POINT $(0, -11)$.
- NEGATIVE SLOPE OF 3: THE LINE SHOULD DECLINE FROM LEFT TO RIGHT, WITH A STEEPNESS PROPORTIONAL TO THE SLOPE.
- X-INTERCEPT NEAR -3.67: THE LINE SHOULD CROSS THE X-AXIS AROUND $x \approx -3.67$.

COMMON PITFALLS:

- GRAPHS WITH INCORRECT INTERCEPTS (SUCH AS CROSSING AT $y=0$ OR $y=5$).
- GRAPHS WITH POSITIVE SLOPES OR LESS STEEP DECLINES.
- LINES THAT DO NOT PASS THROUGH THE CALCULATED INTERCEPT POINTS.

STEP-BY-STEP APPROACH TO CONFIRM THE CORRECT GRAPH

TO CONFIDENTLY SELECT THE CORRECT GRAPH, FOLLOW THESE STEPS:

1. IDENTIFY THE Y-INTERCEPT:

- CHECK WHICH GRAPH CROSSES THE Y-AXIS AT APPROXIMATELY -11 .

2. CHECK THE SLOPE:

- PICK TWO POINTS ON THE GRAPH THAT ARE EASY TO IDENTIFY AND VERIFY THE SLOPE. FOR EXAMPLE, FROM $(0, -11)$ TO $(1, -14)$, THE CHANGE IS $(\Delta x=1, \Delta y=-3)$, CONFIRMING THE SLOPE OF -3 .

3. VERIFY THE X-INTERCEPT:

- FIND WHERE THE LINE CROSSES THE X-AXIS AND SEE IF IT IS AROUND -3.67 .

4. COMPARE WITH THE EQUATION FEATURES:

- ENSURE THE GRAPH'S FEATURES ALIGN WITH THE CALCULATED INTERCEPTS AND SLOPE.

IMPLICATIONS AND SIGNIFICANCE IN MATHEMATICAL CONTEXT

UNDERSTANDING AND CORRECTLY INTERPRETING EQUATIONS LIKE $y = -3x - 11$ ARE FUNDAMENTAL IN ALGEBRA AND ANALYTICAL GEOMETRY. THIS PROCESS EXEMPLIFIES HOW ALGEBRAIC TRANSFORMATIONS FACILITATE COMPREHENSION OF A GRAPH'S SHAPE AND POSITION. MOREOVER, RECOGNIZING THE SLOPE-INTERCEPT FORM ENABLES STUDENTS TO QUICKLY IDENTIFY KEY FEATURES WITHOUT EXTENSIVE CALCULATIONS.

THIS SKILL IS NOT MERELY ACADEMIC; IT HAS PRACTICAL APPLICATIONS IN FIELDS SUCH AS PHYSICS (MOTION GRAPHS), ECONOMICS (COST FUNCTIONS), AND SOCIAL SCIENCES (TREND ANALYSIS). ACCURATE GRAPH INTERPRETATION ENHANCES DATA VISUALIZATION, DECISION-MAKING, AND PROBLEM-SOLVING ABILITIES.

CONCLUSION: HOW TO APPROACH SIMILAR PROBLEMS

IDENTIFYING THE CORRECT GRAPH FOR A GIVEN ALGEBRAIC EQUATION INVOLVES A STRUCTURED APPROACH:

- CLARIFY THE EQUATION: ENSURE UNDERSTANDING OF THE NOTATION AND VARIABLES.
- SIMPLIFY THE EQUATION: REWRITE IN SLOPE-INTERCEPT FORM IF POSSIBLE.
- EXTRACT KEY FEATURES: DETERMINE SLOPE, INTERCEPTS, AND BEHAVIOR.
- MATCH FEATURES TO GRAPHS: USE THE VISUAL CUES IN OPTIONS TO FIND THE BEST FIT.

- VERIFY WITH CALCULATIONS: CROSS-CHECK POINTS AND SLOPES ON THE CANDIDATE GRAPHS.

BY MASTERING THIS APPROACH, STUDENTS CAN CONFIDENTLY ANALYZE AND INTERPRET LINEAR EQUATIONS, TRANSFORMING ABSTRACT SYMBOLS INTO MEANINGFUL VISUAL REPRESENTATIONS.

FINAL NOTE:

GIVEN THE ANALYSIS ABOVE, THE GRAPH REPRESENTING $Y = -3x - 11$ (ASSUMING THE INITIAL NOTATION WAS A TYPOGRAPHICAL ERROR) WOULD BE A STRAIGHT LINE CROSSING THE Y-AXIS AT -11 WITH A STEEP NEGATIVE SLOPE. WHEN PRESENTED WITH MULTIPLE OPTIONS, SELECT THE ONE THAT PASSES THROUGH $(0, -11)$, DECLINES FROM LEFT TO RIGHT WITH A SLOPE OF APPROXIMATELY -3 , AND CROSSES THE X-AXIS NEAR -3.67 . THIS COMPREHENSIVE UNDERSTANDING REINFORCES THE IMPORTANCE OF ALGEBRAIC TRANSFORMATIONS AND VISUAL ANALYSIS IN MASTERING GRAPH-RELATED PROBLEMS.

Select The Correct Answer Which Graph Represents This Equation $Y = 4 - 3X$

Select The Correct Answer Which Graph Represents This Equation $Y = 4 - 3X$

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